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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/710,548	07/20/2004	Dureseti Chidambarao	FIS920040178US1	4547

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INTERNATIONAL BUSINESS MACHINES CORPORATION  
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2070 ROUTE 52  
HOPEWELL JUNCTION, NY 12533

EXAMINER

FULK, STEVEN J

ART UNIT PAPER NUMBER

2891

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/13/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/710,548

Applicant(s)

CHIDAMBARRAO ET AL.

Examiner

Steven J. Fulk

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 9, 10, 12, 13 and 15-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9, 10, 12, 13 and 15-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendment filed February 16, 2007, which amends claims 9 and 16 and cancels claims 1-8, 11, 14 and 18-20, has been entered. Claims 9-10, 12-13 and 15-17 are currently pending.

### ***Specification***

2. The amendment to the Specification filed February 16, 2007 is objected to because of the following informalities: The corrected passage recites "The layer 412 deposits as...". The examiner believes this should read "The layer [420] deposits as...". Appropriate correction is required.

### ***Double Patenting***

3. Applicant has amended the claims to overcome the Double Patenting rejection previously set forth. Therefore, the Double Patenting rejection has been withdrawn.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 9-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Fujimaki '725.

Fujimaki discloses a bipolar device comprising a collector region (fig. 2, NPN transistor, 105), a base film (fig. 4, 118b) disposed atop the collector region; an emitter structure (fig. 4, 122) formed atop the base layer; and a nitride stress film (fig. 4, 117) disposed adjacent the emitter structure and atop the base film, wherein the nitride film covers exposed surfaces of the emitter structure (fig. 4, lower surfaces of "T" in emitter 122 are covered by nitride layer 117); wherein the stress film is disposed in close proximity to an intrinsic portion of the device (p-n junctions form intrinsic regions); and wherein the emitter structure is "T-shaped" (122), having a lateral portion atop an upright portion, a bottom of the upright portion forms a contact to the base film, and the lateral portion overhangs the base film.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 12-13 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujimaki '725 in view of Ko et al. '470.

Fujimaki discloses all of the elements of the claims as set forth in paragraph 5 above, including forming a nitride stress film atop the base film, but the reference

does not explicitly disclose the film to be a means to create compressive strain to increase the mobility of electrons in the device and a means to create tensile strain to increase the mobility of holes in the device, wherein the stress film has at least 0.5 GPa intrinsic stress. Ko et al. teaches a method of forming tensile and compressive stress using a silicon nitride layer (fig. 3g, 238/228) having at least 0.5 GPa stress (§38) to improve carrier mobility in a transistor (§43).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the stress of the nitride layer of Fujimaki as taught by Ko et al. One would have been motivated to do this because Ko et al. taught that creating tensile and compressive stress in a transistor increased the carrier mobility in the device (§43), thus improving the performance of the device.

#### ***Response to Arguments***

8. Applicant's arguments with respect to the rejection over Fujimaki have been fully considered but they are not persuasive. Applicant argues that nitride stress layer of Fujimaki does not anticipate the present invention because Fujimaki does not disclose the nitride layer covering all exposed surfaces of the emitter. This argument is not persuasive because claim 9 is written broadly enough to be anticipated by Fujimaki's nitride layer covering some exposed surfaces of the emitter, specifically the lower surface of the "T" shape of the emitter.

Applicant also argues that Fujimaki's nitride stress layer does not anticipate the present invention because Fujimaki performs additional process steps to reduce the stress in the layer. This argument is not persuasive because, although it is

reduced, there is still inherent stress in the nitride layer and claim 9 is written broadly enough to be anticipated by any amount of stress present in the layer.

9. Applicant's arguments with respect to the rejection over Fujimaki in view of Ko have been fully considered but they are not persuasive. Applicant argues that Fujimaki uses epitaxially grown SiGe and Si to create stress and increase carrier mobility, and not the nitride layer. However, it was the Examiner's position that combination of Fujimaki in view of Ko renders the present invention obvious, specifically the nitride stress layer of Ko could be used in place of the nitride layer of Fujimaki to further increase the carrier mobility, and thus further improve the performance of the device. The use of epitaxially grown SiGe and Si to create stress does not preclude the use of a nitride stress layer to further enhance carrier mobility.

### ***Conclusion***

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be

Art Unit: 2891

calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven J. Fulk whose telephone number is (571) 272-8323. The examiner can normally be reached on Monday through Friday, 9:30am to 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

12. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Steven J. Fulk  
Patent Examiner  
Art Unit 2891  
April 9, 2007

SSF

  
B. WILLIAM BAUMEISTER  
SUPERVISOR, PATENT EXAMINER  
TECHNOLOGY CENTER 2891